

Sub B1
cont

U.S. National Stage of International Application No. PCT/JP99/05838

wherein said hard coating comprises a nitride-based material containing titanium nitride and at least one element selected from the group consisting of Zr and Hf, and having a face-centered cubic crystalline structure with a lattice constant ranging from 0.414 to 0.423 nm in a crystal of said nitride-based material.

22. A sliding member according to any of claims 19, 20 and 21, wherein said nitride-based material has a chemical composition defined in a formula, excepting inevitable impurities:

$Ti_{(100-x)}Me_x$ nitride compound

where Me represents one element selected from the group consisting of Cr, Zr, Hf and B, and x is in a range given by a relation:

2 atomic % $\leq x \leq$ 30 atomic %.

23. A method for making a sliding member according to any of claims 19, 20 and 21, comprising the steps of: forming a hard coating on said substrate by simultaneously depositing in a vacuum Ti and at least one element selected from the group consisting of Cr, Zr, Hf and B on said substrate while irradiating said substrate with ion beams containing substantially nitrogen ions.

Sub B2

24. A sliding mechanism comprising a combination of a movable member and a static member, wherein either said movable member or said static member is made of a sliding member according to any of claims 19, 20 and 21, or made by a method comprising the steps of: forming a hard coating on said substrate by simultaneously depositing in a vacuum Ti and at least one element selected from the group consisting of Cr, Zr, Hf and B on said substrate while irradiating said substrate with ion beams containing substantially nitrogen ions, and the remaining member

*Sub
B2
Cont.*
~~is made of a material containing carbon.~~

25. A sliding mechanism according to claim 24, wherein said material containing carbon is a material containing substantially carbon, a material infiltrated with carbon or a thin film containing carbon.

26. A sliding member according to any of claims 19, 20 and 21, wherein said substrate is a metal material.

27. A method according to claim 23 wherein said substrate is a metal material.

28. A sliding mechanism according to claim 24, wherein said substrate is a metal material.

29. A sliding mechanism according to claim 25, wherein said substrate is a metal material.

*A
Sub
B2*
1099074370960
~~30. A dressing tool comprising a sliding member according to any of claims 19, 20 and 21, or comprising a sliding member made by a method comprising the steps of: forming a hard coating on said substrate by simultaneously depositing in a vacuum Ti and at least one element selected from the group consisting of Cr, Zr, Hf and B on said substrate while irradiating said substrate with ion beams containing substantially nitrogen ions.~~